

## In Favor Of Myself for Athletes": A Controlled Trial to Improve Disordered Eating, Body-Image and Self-Care in Adolescent Female Aesthetic Athletes

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### Abstract

**Objective:** An eating disorder can have devastating effects on an athlete's health and performance, especially in athletes participating in sports in which low body weight or leanness confers a competitive advantage. The current study aimed to develop and examine the impact of a prevention program focused on positive protective factors, to reduce the risk of development of eating disorders and health-compromising behaviors among aesthetic athletes.

**Methods:** Participants were 49 female figure skaters and dancers aged 10-16 years ( $13.1 \pm 1.6$ ) and 46 age-and-branch-matched controls. The intervention program included ten weekly 45 min structured sessions, focusing on promoting self-care habits and positive body esteem. The program was team-based and included multiple interactive methods. Outcomes were measured at baseline, post-intervention, and 3 months follow-up using the Eating Disorders Inventory-2, the Eating Disorders Examination Questionnaire-8, the Thin-Ideal Internalization and Socio-Cultural Attitudes towards Appearance Questionnaire-4, the Body Esteem Scale, and the Body Appreciation Scale.

**Results:** Aesthetic athletes in the prevention program "In Favor of Myself for Athletes" demonstrated significant improvements in several outcome measures, many with a large effect size, compared with control athletes. Results revealed significant decreases in drive for thinness ( $P < 0.001$ ;  $\eta^2 = 0.170$ ) and eating disorder symptoms ( $P < 0.001$ ;  $\eta^2 = 0.243$ ), increased body esteem ( $P < 0.001$ ;  $\eta^2 = 0.213$ ), decreased influences on body image by media ( $P < 0.001$ ;  $\eta^2 = 0.168$ ), and more. The program had greater impact on athletes aged 10-12 years compared to 13-16-year-olds in terms of thin-ideal internalization ( $F(2.79, 160.00) = 3.267$ ;  $p = 0.027$ ) and body esteem ( $F(2.52, 160.00) = 3.095$ ;  $p = 0.038$ ).

**Conclusion:** This study provides an initial indication that "In Favor of Myself for Athletes" may produce an effective impact on promoting a positive body image and self-care in female adolescent athletes.

**Keywords:** Adolescents; Athletes; Eating disorders; Prevention; Self-esteem; Body image; Media literacy

### Introduction

The body of a young aesthetic athlete or dancer often develops in a direction contrary to the paradigm of aesthetic sport, especially in women, while the sport demands being as lean as possible [1]. Therefore a drive for thinness in aesthetic athletes may influence perceptions of self-appearance and performance [1].

Aesthetic sports are defined as sports in which athletes or their coaches expect higher scores when the athlete's body mass and shape conform to a perceived body ideal. Aesthetic sport branches include rhythmic and artistic gymnastics, figure skating, diving and synchronized swimming [2]. Dancers are often included in this group, as low levels of body mass and fat mass are often considered to be advantageous for movement efficacy and artistic expression [3].

It is well established that more female athletes than non-athletes suffer from eating disorders and disordered eating behaviors [4]. The prevalence is even higher for aesthetic athletes and dancers [5,6], especially at adolescence [7]. In addition to the general biological,

psychological, and sociocultural eating disorder risk factors, sport-specific factors such as dieting pressure, achieving personality, early specialization, traumas and injuries, coaching, and sport regulations have been proposed as reasons that athletes are more at risk [8]. Female aesthetic athlete populations have shown elevated levels of perfectionism, anxiety, self-esteem, and achievement goals compared with non-athletes [8-10]. Striving for perfection and over-achieving may be beneficial in terms of athletic performance, but might also predispose athletes to eating disorders [11].

Stice et al. identified two pathways leading to the development of eating disorders: a body dissatisfaction pathway that is amplified by depressive symptoms, as well as a pathway characterized by self-reported dieting with an absence of high body dissatisfaction [12]. This finding suggests that eating disorder prevention programs should target young women with body image and weight concerns, elevated depressive symptoms, and reported dieting behaviors [12].

Although a meta-analysis examining the general body image of athletes concluded that athletes have a slightly more positive body image than non-athletes [13], recent studies such as Leites et al. who compared artistic gymnasts and non-athletes, found that body dissatisfaction is related to risk behaviors for eating disorders,

nutritional and mood status, and media influence, similar to relations established in the group of non-elite athletes [14,15].

These inconsistencies are likely due to the ways in which body dissatisfaction is assessed [8]. Athletes have been found to be more appreciative of their bodies [16], but also to be more critical and sensitive about their appearance [14]. An additional factor to be considered is the vulnerability to media messages of body appearance and social acceptance [17], which have become much common in the past years.

The current study was performed in Israel, a country with Westernized norms, which may explain the similar rates of eating disorders in the general Israeli female population [18]. Repeated exposure to the Western society's unrealistic messages about thinness and beauty promotes internalization of the societal beauty ideal [19], and body dissatisfaction results from the discrepancy between how one looks and how one thinks she should look [20]. Israeli youth are troubled by eating-related disturbances at even higher rates than many other Westernized countries [21]. Since limited data existed on rates of eating disorder symptoms among Israeli athletes or dancers, we previously performed a cross-sectional study comparing adolescent female figure skaters, gymnasts, and dancers, to age-matched non-athletes [22]. Results showed a significantly higher risk among athletes and dancers for developing eating disorders, with more pathologic scores in all subscales of the Eating Disorder Inventory-2 (EDI-2), the Body Esteem Scale (BES), and The Sociocultural Attitudes towards Appearance Questionnaire-4 (SATAQ-4), compared with non-athletes. No differences were found between the figure skaters, dancers, and gymnasts in any outcome measure [22]. The results of the cross-sectional study highlighted the need for an eating disorder prevention program that could be delivered to young female athletes in Israel.

Proper prevention and treatment strategies are necessary, as consequences of the disordered eating continuum can be severe in terms of both health and athletic performance [23]. There is a clear need for early prevention of unhealthy behaviors and body-image concerns among female aesthetic athletes. Researchers have argued that programs aimed at promoting a healthy body image are likely to be more effective when conducted with preadolescents, as attitudes and behaviors often become entrenched and difficult to modify in adolescence. Moreover, delivering prevention programs while athletes are still young and before they start developing eating disorder symptoms might be more effective in the long run [24]. Although the literature on the effects of eating disorder prevention programs for aesthetic athletes is somewhat limited, evidence suggests that selective eating disorder prevention programs directed at high-risk athletes are able to reduce risk factors associated with eating disorders [24]. An example of a successful program is the Athletes Targeting Healthy Exercise and Nutrition Alternatives (ATHENA) prevention program aimed to reduce female athletes' disordered habits and discourage the use of body-shaping substances. The athletes that participated in the ATHENA program showed positive changes in healthy eating behaviors, reductions in intentions toward future use of diet pills, vomiting to lose weight, and use of tobacco and muscle-building supplements [25]. Additional interventions for athletes have been based on 8-session ATHENA curriculum as well [26]. Another example, although focusing on adults and not adolescents, is Becker et al. study investigating the effect of two different prevention programs on 157 female collegiate varsity athletes. Teams of athletes were assigned to either a dissonance prevention program, which included information on the female athlete triad as well as a discussion of the

body image pressures placed on athletes in their specific sport, or a healthy weight intervention, which included information on the female athlete triad as well as a discussion of the sport-specific thin-ideal and the athlete-specific healthy-ideal. Results indicated that both interventions reduced thin-ideal internalization, dietary restraint, bulimic pathology, shape and weight concern, and negative affect at 6 weeks, and bulimic pathology, shape concern, and negative affect at 1 year [27]. Smith et al. also studied the effectiveness of different intervention programs, including a cognitive-dissonance-based intervention, on the body dissatisfaction, negative affect, dietary restriction, and internalization of the sociocultural ideal of 29 female collegiate athletes. Time by Group interaction for each measure was not statistically significant, indicating no treatment effects [19].

Successful intervention programs are interactive and use a multi-model approach [24,28]. Such programs target body image and internalization of thinness, media literacy, and the importance of self-care habits. It has been suggested that including graphic details, media reports, or case studies about eating disorder behaviors may cause or worsen symptoms in vulnerable individuals and may trivialize or glamorize the illness [29]. A meta-analysis determining the effectiveness of eating disorder prevention programs in the general population, which included 57 studies [30], reported small improvements in general eating abnormalities, dieting, and thin-ideal internalization. When focusing on athletes, it is important that the program addresses topics specific to the sport branch, so that the participants can relate to the content and be willing to share their feelings [31]. Interventions for athletes should also be delivered within teams because body image concerns may vary according to sport [27].

Some of the limitations detected in current intervention programs were as follows: targeting risk behaviors that were relatively low to begin with [32], targeting mainly nutrition knowledge [33] rather than general self-care and body image perceptions or distortions, only a few targeted media literacy [25] and most were relatively short [33].

The current study addressed some of the limitations reported in previous programs, and aimed to include factors that have been shown to improve program effectiveness, such as sport branch-related content and team-based sessions. Our mission was to develop an interactive prevention program delivered to small groups of female aesthetic athletes as the first step of implementing and disseminating "In Favor of Myself" in the sports environment. The original version of "In Favor of Myself" is currently implemented in public elementary and high schools by the Israeli National Ministry of Education. "In Favor of Myself for Athletes" aimed to promote positive self-esteem and body image, improve self-care habits, as well as media literacy, among adolescent female aesthetic athletes. We hypothesized that program participation would reduce pathological eating behaviors and external effects on body image, thereby promoting a positive body-image and improving self-care habits.

## Methods

### Study design and sample size calculation

A non-randomized, controlled experimental group design was conducted among female adolescent aesthetic athletes in the north of Israel.

A power calculation based on the body esteem scale score of Israeli aesthetic female athletes [22] showed that 31 subjects in each group would be sufficient to show significant differences (10%) between

groups ( $p < 0.05$ ) with 80% power. Taking a 15% drop-out rate into account, at least 36 subjects in both the intervention and control groups would be sufficient.

### Procedures and participants

The study protocol was approved by the institutional review board of Tel Hai Academic College. The trial registration number is NCT03211468. Managers and coaches of aesthetic sports (dance, gymnastics, and figure skating) clubs and teams from Israel were approached by interview, and were presented with a slideshow describing the study and the prevention program. Three clubs agreed to participate in the study. As agreed with club managers, the first 15 athletes to sign up from each club were selected to participate in the intervention groups. The rest could sign up for the program in the next semester, which occurred in one team of figure skaters. The program was advertised by fliers and posters in each club, and coaches received an explanation about the program that they were encouraged to pass on to their students. Athletes were told they had the opportunity to sign up for a 10-weekly post-practice program that would include activities regarding self-care habits like healthy nutrition for athletes, media literacy, and positive body image.

The intervention group consisted of 49 Israeli female adolescent aesthetic athletes (31 figure skaters and 18 dancers of varying levels of competition), aged 10-15 years ( $M=12.9$ ,  $SD=1.5$ ). The control group consisted of 46 female athletes (27 figure skaters and 19 dancers of varying levels of competition), aged 10-16 years ( $M=13.3$ ,  $SD=1.7$ ), also recruited *via* their coaches or club managers. Control athletes belonged to clubs that were either unwilling to participate in the intervention due to lack of time, or were too far away for the group facilitator to get to each week. Therefore, random assignment was not

used for logistic reasons and club limitations. Since they could not participate in the intervention, control participants were compensated by payment of 50 NIS (~\$15) for all assessment points. The program was considered advantageous to the intervention athletes, so no additional compensation was necessary. Prior to participation in the study, written informed consent was obtained from the participants and their legal guardians, and the anonymity of results was ensured. All study participants completed similar self-report computerized questionnaires at baseline, post-intervention (at 2 months) and at a 3 month follow-up session. A blinded statistician performed the data analysis.

### Program description

The intervention program "In Favor of Myself for Athletes" was developed to prevent eating disorders, to improve body image and self-image, and to promote self-esteem. The program was based on content and methods examined in intervention programs in previous studies [25,31,34]. The program was based on ten weekly 45 min sessions, and located at the club or team facility, usually at the end of the practice curriculum.

The topic and a brief description of each session are presented in Tables 1-3. The format of the sessions included a short recalling of the previous session, an interactive activity such as a game or video related to the content of the session, and a group discussion in which each participant was encouraged to share her feelings or opinions. Occasionally, the participants received a small assignment to complete at home, such as applying critical thinking to commercials while watching television. Our aim was to keep the program as interactive and experiential as possible, as shown to be most effective in youth [35].

Session	Topic	Description
1	Introduction	Acquaintances; Discussion of expectations; Introduction of the program and its goals; Establishment of a group contract.
2	Self-esteem and inspirations	Introduction of inspirational influences on our self-esteem; Conceptualization of external and internal characteristics; Examination of the components of the self-image.
3	Media literacy	Identification of the hidden media messages in relation to female athletes; Learn about advertisement strategies used by the media; Development of critical thinking regarding these messages.
4	Beauty ideals in sports	Recognition of the beauty ideal in sports compared to the popular beauty ideal; Challenge the beauty ideal represented by the media
5	Accepting changes	Recognition of adolescence as a period full of changes that are often uncontrollable; Learn how to deal with and accept these changes.
6	Self-care	Importance of self-care and a balanced diet for adolescent athletes.
7	Self-care and moderation	Understanding the principle of balance and moderation vs. extremes/perfectionism; Understanding the importance of maintaining a healthy energy balance; Understanding the importance of sleep.
8	Myths in sports, and nutrition	Familiarization with common nutrition and sports-related myths and learning the facts about diets; Aspirations for healthier habits.
9	Goals and dreams	Setting personal goals or dreams for the future, and how to utilize the knowledge gained in the program to achieve these dreams.
10	Conclusion	Summary of the subjects that were discussed during the program; Lessons learned/ changes made following the program.

**Table 1:** "In Favor of Myself for Athletes" session topics and descriptions.

Another goal was to create a program for athletes that focused almost exclusively on the protective factors against the development of

eating disorders, such as media literacy, self-care behaviors, and moderation as opposed to perfectionism. The program was designed to

avoid direct mentions of eating disorder content, as recommended in the literature [29], and provide the participants with meaningful

experiences as opposed to educating them with nutritional information.

Age (years)	Intervention (n=49)	Control (n=46)	P-Value
10-12	15 (30.6%)	13 (28.3%)	0.802
12-16	34 (69.4%)	33 (71.7%)	
<b>Parental Status</b>			
Married	39 (79.6%)	38 (82.6%)	0.157
Divorced	10 (20.4%)	6 (13.0%)	
Single-parent	0 (0.0%)	2 (4.3%)	
<b>Number of siblings</b>			
≥ 4	46 (95.8%)	42 (95.5%)	0.929
≤ 5	2 (4.2%)	2 (4.5%)	
<b>Birth order</b>			
Eldest child	14 (28.6%)	16 (34.8%)	0.655
Youngest child	18 (36.7%)	13 (28.3%)	
Other	17 (34.7%)	17 (37.0%)	
<b>Religious status</b>			
Religious	1 (2.0%)	0 (0.0%)	0.275
Conservative	8 (16.3%)	12 (26.1%)	
Secular	40 (81.6%)	34 (73.9%)	

**Table 2:** Demographic characteristics of the study population-n (%).

Each intervention group included approximately 10 participants, either figure-skaters or dancers, divided by teams and by age groups: 10-12 years old and 13-15 years old. Overall, the program was delivered to four groups, one of each age group of dancers and of figure skaters. The decision to divide the groups by teams was based on research that showed advantages of team-based intervention [25], and also because body image concerns may vary according to the sport [27,36]. One disadvantage of the team-based model lies in the risk of peer pressure among team members that may increase the risk of eating disorder behaviors [36]. We hoped that the program content would help increase team support and provide a healthier communication outlet for the participants. The additional division by age groups was made so that content could be tailored to the specific needs of each stage of adolescence [34]. For the 10-12 year old group, some modifications were made in the program content to make it more age-appropriate. For example, the self-care behaviors discussed focused more on personal hygiene and general health among the younger groups, while the older groups discussed deeper topics such as psychological health.

The sessions were facilitated by an MSc. student and took place at the participants' training centers in Israel. The student was chosen to facilitate the groups due to her background in figure skating coaching, choreography, and sports nutrition. She also participated in group facilitation courses, and received ongoing individual supervision from a group social worker throughout program delivery. The developer of

"In Favor of Myself" programs supervised the groups' progression as well.

### Measures

The following items and scales were included in the assessment process:

### Participant demographic and anthropometric characteristics

Personal and familial details were obtained by self-report from each participant including sports habits: number of weekly training hours and annual competitions, current height (in cm) and weight (in kg). Body Mass Index (BMI) was calculated (weight in kg/height in m<sup>2</sup>), as well as BMI percentiles and Z-scores (BMI for age, World Health Organization).

One item regarding history of eating disorder pathology was included. Participants were asked to report their history of eating disorders, categorized by: (1) no history of problems with eating or body weight; (2) a history of body dissatisfaction that was not expressed by changes in eating behaviors; (3) a history of body dissatisfaction that led to repeated and sometimes extreme eating behaviors such as dieting, throwing up, or use of laxatives; (4) a history of body dissatisfaction that led to plastic surgery; (5) a history of a clinically-diagnosed eating disorder that wasn't treated; (6) a history of treatment for a clinical eating disorder; or (7) currently in treatment

for a clinical eating disorder. In the data analysis, categories 1-2 were grouped as "no history of eating disorders or disordered eating", categories 3-4 were grouped as "history of disordered eating",

categories 5-6 were grouped as "history of eating disorders". None of the participants reported a current eating disorder.

	Intervention (n=49)	Control (n=46)	P-value
<b>Sport branch</b>			
Figure skating	31 (63.3%)	27 (58.7%)	0.648
Dance	18 (36.7%)	19 (41.3%)	
<b>Weekly training hours</b>	8.3 (12.51)	7.2 (2.30)	0.187
<b>Annual competitions</b>			
0	2 (4.1%)	2 (4.3%)	0.198
1-5	42 (85.7%)	33 (71.7%)	
6 $\geq$	5 (10.2%)	11 (23.9%)	
<b>BMI z-score</b>	-0.03 (0.87)	0.11 (0.80)	0.412
<b>BMI range (percentiles for age*)</b>			
Healthy (5%-85%)	44 (89.8%)	39 (84.8%)	0.298
Overweight (above 85%)	4 (8.2%)	7 (15.2%)	
Underweight (below 5%)	1 (2.0%)	0 (0.0%)	
<b>History of EDs symptoms</b>			
No history of DE or EDs	42 (85.7%)	43 (93.5%)	0.218
History of DE	7 (14.3%)	3 (6.5%)	
Diagnosed with ED	0 (0.0%)	0 (0.0%)	
*BMI for age (5-19 years), World Health Organization (WHO) references			

**Table 3:** Anthropometric and sport-specific characteristics of the study population.

### Disordered eating

To assess current pathological behaviors and perception, the Eating Disorders Inventory-2 (EDI-2) was used [37]. The EDI-2 consists of 91 items divided into 11 subscales, 4 of which we used: Drive for Thinness, Body Dissatisfaction, Perfectionism, and Maturity Fears. The subscale scores are rated on a 6-grade scale [37,38]. The Drive for Thinness subscale includes statements such as "I am terrified of gaining weight." The Body Dissatisfaction subscale includes statements such as "I think that my thighs are too large." The Perfectionism subscale includes statements such as "I feel that I must do things perfectly or not do them at all." The Maturity Fears subscale includes statements such as "I feel that people are happiest when they are children." The EDI-2 has been previously used in athlete populations [3], and the Hebrew version of the EDI-2 has been previously validated in Israel [39]. In the current study, these subscales demonstrated relatively high levels of internal consistency, indicated by a range of Cronbach's alpha values of 0.70-0.95. The four scales were chosen following our previous study [22] in which adolescent female aesthetic athletes scored the most pathologic scores on these subscales.

The Eating Disorders Examination Questionnaire-8 (EDEQ-8) was used to assess eating disorder symptoms. This 8-item version of the original 28 item EDE-Q has excellent item characterization, and the reliability of the shortened version is very high [40]. A strong correlation was found between the 8 item version and the original EDE-Q ( $r=0.97$ ,  $P<0.001$ ) [40]. The 8 item version includes key statements such as "Have you tried to exclude from your diet any foods that you like in order to influence your shape or weight?" and "Have you felt fat?" For each statement, the participants are asked to circle the frequency of occurrence in the past 28 days. The Hebrew version of the EDEQ has been previously validated in Israel [41]. In the current study, the Cronbach's alpha value of the scale was 0.97.

### Thin-ideal internalization and socio-cultural pressures

The Sociocultural Attitudes towards Appearance Questionnaire-4 (SATAQ-4) was used to assess internalization of appearance ideals due to societal and interpersonal pressures [42]. It consists of 22 items divided into five subscales: (1) Internalization of Thin Ideal (to what extent a respondent endorses a thin body with low body fat as an ideal). The subscale includes statements such as "I want my body to be very thin." (2) Internalization of muscular/athletic ideal (to what extent



a respondent endorses an athletic body with muscles as an ideal). The subscale includes statements such as "It is important for me to look muscular." (3) Pressures by family (to what extent a respondent feels pressure from family to obtain a certain appearance). The subscale includes statements such as "I feel pressure from family members to decrease my level of body fat." (4) Pressures by peers (to what extent a respondent feels pressure from peers to obtain a certain appearance). The subscale includes statements such as "I feel pressure from my peers to improve my appearance." (5) Pressures by media (to what extent a respondent feels pressure from the media to obtain a certain appearance) The subscale includes statements such as "I feel pressure from the media to look thinner." [43]. The third version of the SATAQ (SATAQ-3) has been previously validated in athletes [14,44], and the SATAQ-4 showed high internal consistency in Israeli female aesthetic athletes in our previous study [22]. The mean subscale scores are rated on a 6-grade rating scale [42]. In the current study, the subscales had high internal consistency, indicated by a range of Cronbach's alpha values of 0.85-0.97. Body esteem and body appreciation

The Body Esteem Scale (BES) for adolescents and adults [45] was used to assess body perceptions. It consists of 23 items divided into 3 subscales: Appearance, Weight, and Attribution. The Appearance subscale includes statements on the general feelings about appearance such as "I like what I see when I look in the mirror." The Weight subscale includes statements on the satisfaction with body weight such as "My weight makes me happy." The Attribution subscale includes statement on the evaluations attributed to others about one's body and appearance, such as "People my own age like my looks." The mean total and subscale scores are rated on a 5-point Likert scale. Higher scores represent higher body esteem [46]. The BES has been previously used for aesthetic athletes [31]. In the current study, the subscales had high internal consistency, indicated by a range of Cronbach's alpha values of 0.93-0.97.

The Body Appreciation Scale (BAS) was used to assess body image and acceptance, engagement in healthy behaviors, and rejection of unrealistic body images portrayed in the media. This scale includes 13 items and mean scores are rated on a 5-point Likert scale. The BAS includes statements such as "I respect my body" and "I am attentive to my body's needs." Higher scores represent higher body appreciation [47]. The BAS has been used for female athlete populations [48], and the Hebrew version of the BAS has been previously validated in Israel [49]. In the current study, the subscales had high internal consistency, indicated by a total Cronbach's alpha value of 0.97.

### Data analysis

All analyses were conducted using SPSS 23\* (IBM Corp., 2016). Normality distributions and outliers for each outcome variable were examined prior to commencing analysis. Chi-squared analyses for categorical variables and independent sample t-tests for continuous variables were conducted to test differences between intervention and control groups in the demographic, anthropometric, and sport-specific variables.

Repeated measures analysis of variance (ANOVA) were conducted to test the differences between intervention and control groups in

outcome variables in all three study times, and the group by time interactions. The Bonferroni correction method was used to control for multiple comparisons. Greenhouse Geisser correction was used when sphericity could not be assumed by Mauchly's sphericity test. The variables: age group (10-12 years/13-15 years) and sport branch (dance/figure skating) were included in the repeated measures model as fixed factors. As no significant group\*time\*sport branch interactions were found, the results were not presented.

Program satisfaction and attendance were examined at post-intervention.

Effect size is described using partial  $\eta^2$  (Partial eta-squared), where 0.01 constitutes a small effect, 0.06 a medium effect, and 0.14 a large effect [50]. An alpha level of  $p < 0.05$  was used.

## Results

### Descriptive statistics

Demographic, anthropometric, and sports related characteristics of the study sample were examined (Tables 2 and 3). No significant differences were found using Bonferroni's post hoc tests between the intervention and control groups.

Differences in outcome variable scores between the intervention and control groups were also tested at baseline. The intervention group had a significantly higher baseline score in EDI-2 Body Dissatisfaction and Maturity Fears subscales, and significantly lower baseline scores in the total BAS scale. All three results indicate higher pathology in the intervention group compared with the controls. In order to control for baseline differences, the baseline scores for Body Dissatisfaction, Maturity Fears, and BAS were included as covariates in the repeated measures analyses. Therefore, only post-intervention (T2) and follow-up (T3) were analyzed for these three variables (Table 4).

### Intervention effects: Group\*Time interactions

#### Disordered eating

Differences between study groups over time: baseline (T1), post-intervention (T2), and 3 month follow-up (T3) are presented in Table 4. Repeated measures ANOVA analysis showed significant differences between groups and between times in the EDI-2 Drive for Thinness subscale and in the EDEQ-8 scores. The intervention group showed significantly lower scores following the intervention, indicating a reduction in pathology, between T1, T2, and T3, while no differences were found between times in the control group. Overall group\*time interactions were significant ( $p < 0.001$ ) with large effect sizes. No significant group by time interactions were found in the EDI-2 Perfectionism or Maturity Fears subscales. Several baseline scores were relatively low at baseline (compared with norms shown in Table 4). While also considering the baseline differences between the groups (higher scores among the intervention participants compared to controls), the clinical implications of the score reductions following the intervention are unclear and may be mainly associated with higher pathology to begin with.

Scale	Subscale	Group	T1 M(SE)	T2M (SE)	T3 M (SE)	F	Sig	$\eta^2$	Norms
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<b>Eating Disorders Inventory -2 (EDI-2)</b>	Drive for thinness	Intervention	4.77 (0.80) <sup>a</sup>	2.01 (0.63) <sup>b</sup>	2.07 (0.67) <sup>b</sup>	F(1.46, 80.00)=16.565	P<0.001*	0.17	7.24 (7.07) <sup>2</sup>
		Control	3.12 (0.88)	3.52 (0.69)	3.83 (0.73)				
	Body dissatisfaction	Intervention	6.17 <sup>a</sup> (0.90)	1.78 <sup>b</sup> (0.53)	1.65 <sup>b</sup> (0.53)	F(1.00,82.00)=19.866	0.827	0.001	2.54 (4.31) <sup>2</sup>
		Control	2.44 (0.98)	2.67 (0.58)	2.42 (0.58)				
	Perfectionism	Intervention	7.78 (0.63) <sup>a</sup>	7.12 (0.59) <sup>a</sup>	6.17 (0.56) <sup>b</sup>	F(1.84,80.00)=2.340	0.056	0.044	5.85 (4.90) <sup>2</sup>
		Control	8.14 (0.69)	8.35 (0.65)	7.81 (0.62)				
	Maturity Fears†	Intervention	8.17 <sup>a</sup> (0.62)	5.53 <sup>b</sup> (0.40)	5.96 <sup>b</sup> (0.45)	F(1.00,82.00)=0.114	0.737	0.001	6.11 (4.81) <sup>2</sup>
		Control	5.92(0.68)	6.41(0.40)	6.66(0.45)				
	<b>Eating Disorder Examination Questionnaire-8 (EDEQ-8)</b>	Intervention	1.86(0.22) <sup>a</sup>	0.95 (0.19) <sup>b</sup>	1.03 (0.21) <sup>b</sup>	F(1.26, 80.00)=26.039	P<0.001*	0.243	<3.633
		Control	0.97 (0.24)	1.17 (0.21)	1.25 (0.23)				

T1- baseline; T2- post intervention; T3- 3 month follow up; a,b statistically significant differences between scores over study times; \*Statistical significance after Bonferroni correction,  $\alpha$  was divided by number of comparisons; † significant differences at baseline between study groups-T1 included as covariate; Effect sizes: small ( $\eta^2=0.01$ ), medium ( $\eta^2=0.06$ ), and large ( $\eta^2=0.13$ ).

**Table 4:** Differences between study groups over time and literature norms- means, standard errors, p-value, and effect sizes, as well as published norms.

### Thin-ideal internalization and socio-cultural pressures

Differences between study groups over time are presented in Table 5. Significant group by time interactions, with large effect sizes, were found in all of the SATAQ-4 subscales except for the Pressures by Family subscale. The intervention group showed significantly lower scores, indicating a reduction in pathology, between T1, T2 and T3,

while no differences were found between times in the control group. Seeing as baseline scores were similar between groups, the score reductions among the intervention participants suggest that the program was successful in reducing internalization of thinness and athletic ideals, and external pressure to be thin by family, friends and media.

Scale	Subscale	Group	T1 M(SE)	T2 M(SE)	T3 M(SE)	F	Sig	Partial $\eta^2$
<b>SATAQ-4</b>	Internalization Thin Ideal	Intervention	2.84 (0.19) <sup>a</sup>	2.08 (0.19) <sup>b</sup>	2.8 (0.18) <sup>b</sup>	F(1.40,80.00)=23.663	P<0.001*	0.226
		Control	2.65 (0.21)	2.76 (0.20)	2.73 (0.19)			
	Internalization Athletic Ideal	Intervention	2.86 (0.16) <sup>a</sup>	2.50 (0.17) <sup>b</sup>	2.33 (0.16) <sup>b</sup>	F(1.39, 80.00)=8.575	0.002*	0.096
		Control	2.74 (0.18)	2.83 (0.18)	2.85 (0.18)			
	Pressures-Peers	Intervention	1.64 (0.12) <sup>a</sup>	1.23 (0.10) <sup>b</sup>	1.20 (0.11) <sup>b</sup>	F(1.34,80.00)=11.839	P<0.001*	0.128
		Control	1.53 (0.13)	1.69 (0.11)	1.69 (0.12)			
	Pressures-Family	Intervention	1.41 (0.09)	1.25 (0.10)	1.26 (0.10)	F(1.59,80.00)=3.758	0.035	0.044
		Control	1.33 (0.10)	1.42 (0.11)	1.44(0.11)			
	Pressures-Media	Intervention	2.13 (0.15) <sup>a</sup>	1.32 (0.12) <sup>b</sup>	1.36 (0.12) <sup>b</sup>	F(1.35,80)=16.341	P<0.001*	0.168
		Control	1.90 (0.17)	2.01 (0.13)	2.04 (0.13)			

T1- baseline; T2- post intervention; T3- 3 month follow up; a,b statistically significant differences between scores over study times; \*Statistical significance after Bonferroni correction,  $\alpha$  was divided by number of comparisons; Effect sizes: small ( $\eta^2=0.01$ ), medium ( $\eta^2=0.06$ ), and large ( $\eta^2=0.13$ ).

**Table 5:** Differences between study groups over time in thin-ideal internalization and socio-cultural pressures.

### Body esteem and body appreciation

Differences between study groups over time are presented in Table 6. Significant group by time interactions were found in the total BES score and in the Appearance and Weight subscales ( $p < 0.001$ ), with large effect sizes. The intervention group showed significantly higher scores, indicating a reduction in pathology, between T1, T2 and T3, while no differences were found between times in the control group.

No differences were found in the BES Attribution subscale or the BAS scale. The significant score reductions suggest that the program was successful in improving the participants' overall body esteem, and the appearance and weight related body esteem, but had less effect on their evaluations attributed to others with relation to body esteem, or on their body appreciation.

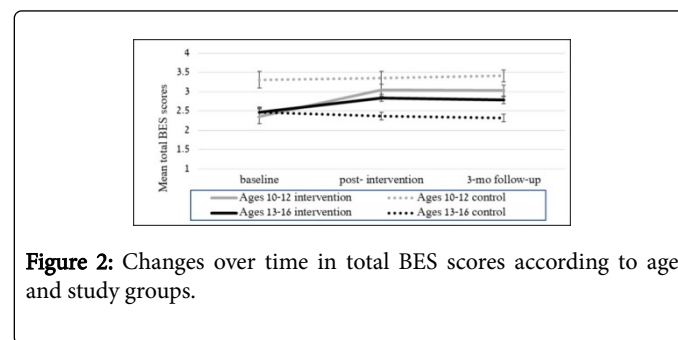
Scale	Subscale	Group	T1 M(SE)	T2 M(SE)	T3 M(SE)	F	Sig	Partial $\eta^2$
BES	Total score	Intervention	2.41 (0.11) <sup>a</sup>	2.94 (0.09) <sup>b</sup>	2.90(0.08) <sup>b</sup>	F(1.26,80.00)= 21.916	P<0.001*	0.213
		Control	2.89 (0.12)	2.87 (1.00)	2.86 (0.09)			
	Appearance	Intervention	2.52 (0.13) <sup>a</sup>	3.05 (0.10) <sup>b</sup>	3.02(0.10) <sup>b</sup>	F(1.44,80.00)= 13.833	P<0.001*	0.146
		Control	2.93 (0.14)	2.92 (0.11)	2.93 (0.11)			
	Weight	Intervention	2.49 (0.15) <sup>a</sup>	3.16 (0.11) <sup>b</sup>	3.18(0.11) <sup>b</sup>	F(1.35,80.00)= 19.889	P<0.001*	0.261
		Control	3.09 (0.16)	3.06 (0.12)	3.00 (0.12)			
Attribution	Intervention	2.04 (0.08)	2.44 (0.07)	2.34 (0.07)	F(1.00,82.00)= 3.636	0.06	0.042	
	Control	2.48 (0.09)	2.37 (0.07)	2.41 (0.07)				
BAS	Total score†	Intervention	3.31 (0.14)	4.40 (0.08)	4.41 (0.09)	F(1.00,82.00)= 0.014	0.906	0
		Control	4.36 (0.15)	3.79 (0.09)	3.81 (0.09)			

T1- baseline; T2- post intervention; T3- 3 month follow up; a,b statistically significant differences between scores over study times; \*Statistical significance after Bonferroni correction,  $\alpha$  was divided by number of comparisons; †Significant differences at baseline between study groups - T1 included as covariate; Effect sizes: small ( $\eta^2=0.01$ ), medium ( $\eta^2=0.06$ ), and large ( $\eta^2=0.13$ ).

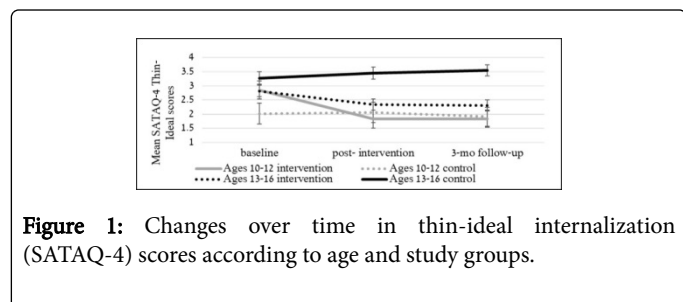
**Table 6:** Differences over time of body esteem and body appreciation scores between study groups.

### Intervention effects: Age\*Group\*Time interactions

The intervention group was divided into age groups within their branch. The younger group included 15 participants aged 10-12 (15 participants total), and the older groups included 34 participants aged 13-16 years. Repeated measures ANOVA analysis, with age group included as a fixed factor, showed a statistically significant Age\*Group\*Time interaction in the SATAQ-4 Internalization of the Thin Ideal subscale score [F(2.79, 160.00)=3.267;  $p=0.027$ ] (Figure 1) and in the total BES score [F(2.52, 160.00)=3.095;  $p=0.038$ ] (Figure 2). While changes over time were significant in both age groups compared with the controls, the younger group (ages 10-12) showed a larger improvement in both variables.



**Figure 2:** Changes over time in total BES scores according to age and study groups.



**Figure 1:** Changes over time in thin-ideal internalization (SATAQ-4) scores according to age and study groups.

### Process evaluation

Process evaluation was assessed by a satisfaction questionnaire filled out by participants at the end of the program (T2), as well as an attendance record from each session.

### Program satisfaction

About 80% of the participants reported high program satisfaction. Program satisfaction by age group is presented in Figure 3. In addition, 98% of the participants said they would recommend the program to their peers.



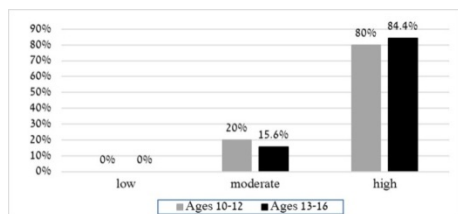


Figure 3: Program satisfaction.

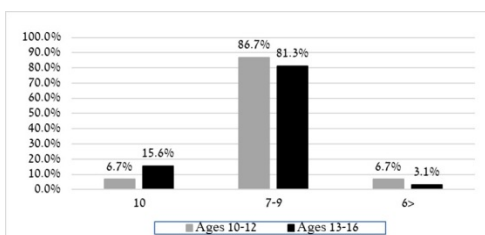


Figure 4: Program attendance.

## Attendance

The majority of the participants attended 7-9 of the 10 sessions. Attendance by age group is presented in Figure 4.

## Discussion

The present study aimed to evaluate the efficacy of "In Favor of Myself for Athletes", an intervention program developed and designed to promote positive body image and improve self-care habits to prevent eating disorders. The program objectives were to reduce drive for thinness and external effects on body image, and improve body esteem and appreciation. Multiple protective factors were targeted to produce a positive effect and a more consistent impact, resulting in beneficial behavioral effects even at 3 months follow-up. The general importance of increasing protective factors and decreasing risk factors for development of eating disorders has been previously studied [51]. Significant improvements were found in several outcome variables among the intervention groups compared with controls, many with a large effect size at both post-intervention and the 3 month follow-up:

### Drive for thinness (EDI-2) and eating disorder symptoms (EDEQ-8)

As hypothesized, "In Favor of Myself for Athletes" was successful in significantly reducing the baseline scores of the intervention group, with no changes found among the controls. These results are similar to previous studies [27,31]. Despite the improvements, it is important to take into account that, in the present study, the baseline Drive for Thinness (EDI-2) and EDEQ-8 scores were closer to normal than to pathological eating disorder scores [52,53]. This has been the case in other programs tested on athletes [32]. The less-than-pathologic scores found in athletes could also be due to underreporting of symptom bias [54], or due to the younger age groups included in the study. It has been suggested that the peak age for developing eating disorders is 15 [55], whereas the mean age in our study was 13.

## Body dissatisfaction

Although improvements were found among the intervention group, their scores were significantly higher than controls' scores at baseline. This made it difficult to assess the actual effect that the program had on the participants' body dissatisfaction. Because of the relationship between body dissatisfaction and the development of eating disorders [56], and the additional risk of female aesthetic athletes, further research is crucial to improve body satisfaction among female adolescent athletes.

## Perfectionism

Personality characteristics such as perfectionism and need for high achievement have been found in athletes [57] and in eating disorder patients [58]. Similarly, the athletes in the current study portrayed higher than normal perfectionism scores, as indicated by EDI-2 Perfectionism scale at baseline. "In Favor of Myself for Athletes" seemed to be slightly successful in reducing levels of perfectionism among the intervention group compared with the controls, although differences from baseline were not significant.

## Internalization of body ideals and external effects on body image

Thin ideal internalization is an established risk factor for eating disorders [59], and athletes are exposed to body and weight related pressures by their team-mates, coaches, parents, and the media [60,61]. "In Favor of Myself for Athletes" showed significant reductions among participants, in all the SATAQ-4 subscales related to internalization of body ideals and external pressures, compared to the control group. These results are comparable to previous programs tested in collegiate athletes [27] and in non-athletes [62].

## Body esteem and body appreciation

As mentioned, "In Favor of Myself for Athletes" was designed to focus on positive, protective factors against the development of eating disorders. One of the main goals was to improve the body esteem and body appreciation of the participants. As far as body esteem, the program proved effective in improving the total BES score, and the appearance and weight subscales, compared with the control group and similar to previous studies [31,63]. Regarding body appreciation, the controls' baseline BAS scores were significantly higher than the intervention group, which made it difficult to assess the program's effect.

As for the effect of age on the differences between groups, there was a significant improvement in both age groups (10-12 and 13-16 years) in thin-ideal internalization (SATAQ-4) and in Body Esteem (BES), although a greater improvement was seen in the younger age group. No other athlete-oriented intervention study examined the influence of different age groups on intervention effects. It has been established that intervention programs can lead to developmental change and engagement in key tasks at younger ages. At later ages, there is less ability to influence behaviors and to relate to figures such as teachers and instructors [64], so our findings may be a result of the greater influences achievable at younger ages compared to older age groups.

The program was team-based and included multiple interactive methods and approaches, as in line with the Athletes Targeting Healthy Exercise and Nutrition Alternatives (ATHENA) prevention program [25], and differing from programs based primarily on didactic

education such as the "Nutrition for Optimal Performance" intervention program [33]. "In Favor of Myself for Athletes" was designed to increase internalization of the contents discussed by forming intimate groups within their teams where participants could feel safe to share their thoughts and confide in their teammates and group leader. Meaningful experiences are more likely to result in long term change and effect compared with educational lectures [20]. The high program satisfaction and the positive outcomes may be partially related to the present intervention's content, which was designed to be very relevant to aesthetic sports, and specifically dance and figure skating.

## Limitations

Despite the positive effects of the interventional program, there are several limitations in this study. First, the lack of random allocation of participants to intervention and control groups reduced the external validity of this study. Second, the sample size in this preliminary study was relatively small, although the number of participants was similar to or larger than other relevant studies [31,65] and addressed the a-priori sample size calculation. Third, the follow-up period in this study was brief, thus, it is unclear whether the positive effects would persist in the longer term. Future research may benefit from using a structured interview instead of or in addition to self-report questionnaires to provide extensive qualitative data and prevent the self-monitored biases.

## Conclusion

The increased risk of developing eating disorders in female aesthetic athletes stems from pressure induced by aesthetic demands, maladaptive self-care patterns, and preoccupation with weight and dieting [65]. This study provides an initial indication that "In Favor of Myself for Athletes" may produce an effective impact on promoting positive body image and self-care in female adolescent athletes. To enhance its impact, a larger-scale, randomized effectiveness trial, with a longer follow-up period and use of structured interviews for assessment, should be performed.

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